Sliding Mode Control in Infinite-Dimensional Setting: Theory Extension and Applications

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Overview

The sliding mode control (SMC) technique is long recognized as a powerful control method to counteract external disturbances and unmodelled dynamics in a system. Since many important plants, such as flexible manipulators and structures, as well as heat transfer processes, tokamak plasma, and fluid mechanical systems, are governed by functional and partial differential equations (PDEs), the research interest emerged to extend the existing SMC algorithms to the infinite-dimensional setting. However, such an extension was not trivial as the consistent SMC development should be capable of not only providing the desired system performance but also of utilizing distributed parameter and time-delay models. First publications on SMC applications to distributed parameter systems corroborated their utility and motivated further theoretical investigations. Although much work has since been done on both theoretical development and practical implementation of SMC in the PDE setting, this topic remains of huge popularity amongst researchers and practitioners due to technological challenges of controlling complex distributed parameter plants.

The primary objectives of the course are as follows:

i) Exposing participants to the fundamentals of sliding mode control in PDE setting.

ii) Build confidence and capability amongst the participants in the application of robust control and estimation tools and techniques for distributed parameter systems.

iii) Providing exposure to practical problems and their solutions, through case studies and live projects.

iv) Enhancing the capability of the participants to apply robust control and estimation methods in a broad range of application domains.

v) Developing the mathematical base of the participants to work on real world distributed parameter systems classified by partial differential equations.

Modules	**A. Mathematical models of Distributed Parameter Systems: 7-8 NOV 2018** **B. Control and Observation using Sliding Modes: 9-10 NOV 2018** **C. Case Studies: 11 NOV 2018** **Number of participants for the course will be limited to thirty. Selection of participants is solely on the discretion of the organizers.**
You Should Attend If…	▪ Engineers, mathematicians, physicists and researchers from industry, service, government organizations including R&D centers. ▪ Students at postgraduate level or higher, research scholars and faculty from academic and technical institutions working on control theory, mathematics and physics related to infinite-dimensional systems and their applications.
Fees	The participation fees for taking the course is as follows: **Participants from abroad : 300 USD** **Industry/ Research Organizations in India : 10000 INR** **Faculties in Academia : 6000 INR** **Students in Academia (PG and above only) : 3000 INR** The above fee includes all instructional materials, computer use for tutorials and assignments, laboratory equipment usage charges, 24 hr free internet facility. **The participants will be provided with accommodation on payment basis.**

The Faculty

Yury Orlov received his M.S. degree from the Mechanical-Mathematical Faculty of Moscow State University, in 1979, the Ph.D. degree in Physics and Mathematics from the Institute of Control Science, Moscow, in 1984, and the Dr.Sc. degree also in Physics and Mathematics from Moscow Aviation Institute, in 1990. He has been a Full Professor of the Electronics and Telecommunication Department, Scientific Research and Advanced Studies Center of Ensenada, Mexico, since 1993. During the scientific career he shared visiting/temporal professor positions in Moscow Aviation Institute, CESAME (Catholic University in Louvain, Belgium), Ecole Central de Lille (France), Robotics Laboratory of Versalle University (France), INRIA (Grenoble, France), IRCCYN (University of Nantes, France), University of Angers (France), University of Cagliari (Italy), and University of Kent (UK). He is the editor of IEEE Trans. Control Systems Technology, IMA Journal of Mathematical Control and Information, and the International Journal of Robust and Nonlinear Control. The research interests include mathematical methods in control, analysis and synthesis of nonlinear, nonsmooth, discontinuous, time delay, distributed parameter systems, and applications to electromechanical systems. He has authored and co-authored about 250 journal and conference papers in the above areas as well as four monographs, including the recent ones called Discontinuous Systems-Lyapunov Analysis and Robust Synthesis under Uncertainty Conditions (Springer Communications and Control Engineering series, 2009) and Advanced H-infinity Control - Towards Nonsmooth Theory and Applications (Birkhauser, Systems and Control: Foundations and Applications series).

Dr. Sohom Chakrabarty did his PhD in Control Systems from Indian Institute of Technology Bombay, India. His work contributed to the advancements in discrete time sliding mode control, which is a modern robust control methodology having wide applications in present day systems design. After PhD, he was engaged as a Research Associate in University of Kent, before joining Indian Institute of Technology Roorkee as an Assistant Professor in Electrical Engineering Department. He had also been a Visiting Researcher with Lodz University of Technology, Poland and Visiting Associate Professor of RMIT University, Australia. Apart from publications in significant journals like Automatica, ISA Transactions, etc., he also has two book chapters published by IET and InTechOpen to his credit. At present, his research interests are control and coordination of multicopter systems, control of networked systems and modelling and analysis of biological systems.

Course Coordinator

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